

VIDEO MAGNETIC FIELD AND VELOCITY FIELDS OF
SOLAR FLARES AND RELATIVE ACTIVE REGION

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By means of Solar Magnetic Field Telescope [1], the fine structure of video magnetic fields (5324A) and sight-of-line velocity fields (4861A) of flare active region on July 23(E53, S19) and Aug. 8(W25, S28) in 1987 has been obtained. The main characters are following:

1. The flares occur in places where there are compressive and osmotic motion between opposite magnetic poles. In some causes, the osmotic opposite magnetic pole dissipates after the flares.
2. Sight-line velocity neutral lines are consistent with the magnetic neutral lines. But in the two ends of "S" shape of magnetic neutral line, the directions of flow passing the magnetic neutral line are opposite. It shows compressive and shearing motion in large scale of the active region. The flares occur near the flow neutral line where there are the most compressive and shearing motion (See Fig.1. and Fig.2.).
3. Chromospheric flow show clearly fiber. The loop and ejective constructions are correspondence magnetic structures.
4. On the feet points of the flares there are down flow about 3--10 km/ Sec. (See Fig.3. and Fig.4.)

Longitudinal Magnetogram by Huarou Solar Station

July 23, 1987 0054UT
Sun Disk Coordinates: E53, S19
Wavelength: 5324A
Frames: 255
Solid: N pole, Dashed: S pole

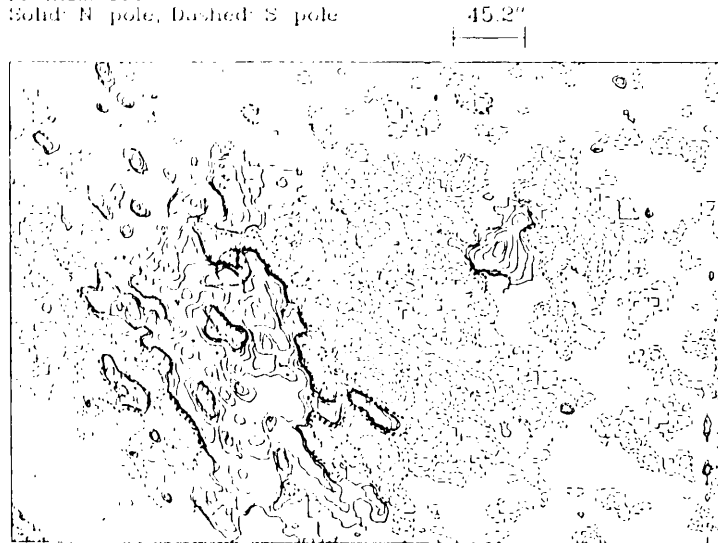


Fig.1 The position of flare was traced by the circle.

Levels: 20,40,80,160,320,640,960,1280,1600,1920,2240... G.

Dopplergram by Huarou Solar Station

July 23, 1987 0609UT
Sun Disk Coordinates: E53, S19
Wavelength: 4861A
Frames: 255
Solid: Blue shift, Dashed: Red shift

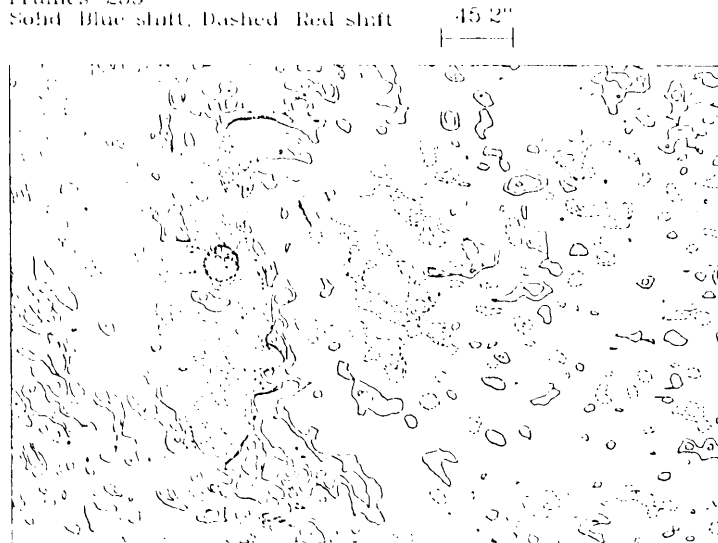


Fig.2. The position of flare is traced by the circle.

The direction of flow is down where flare occurred.

Levels: 400,800,1600,2400,3200,4600,6000...M/Sec.

Longitudinal Magnetogram by Huairou Solar Station

August 08, 1987 0038UT
Sun Disk Coordinates: W25, S28
Wavelength: 5324A
Frames: 255
Solid: N-pole, Dashed: S-pole

45.2"

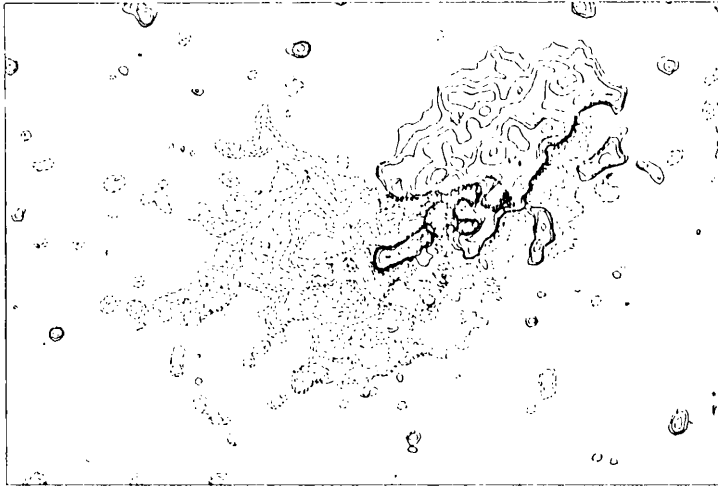


Fig.3. The position of flares are traced by the circle.

There are two places circled can be seen.

Levels: 20,40,80,160,320,640,960,1280,1600,1920,2240... G.

Dopplergram by Huairou Solar Station

August 08, 1987 0135UT
Sun Disk Coordinates: W25, S28
Wavelength: 4861A
Frames: 255
Solid: Red shift, Dashed: Blue shift

45.2"

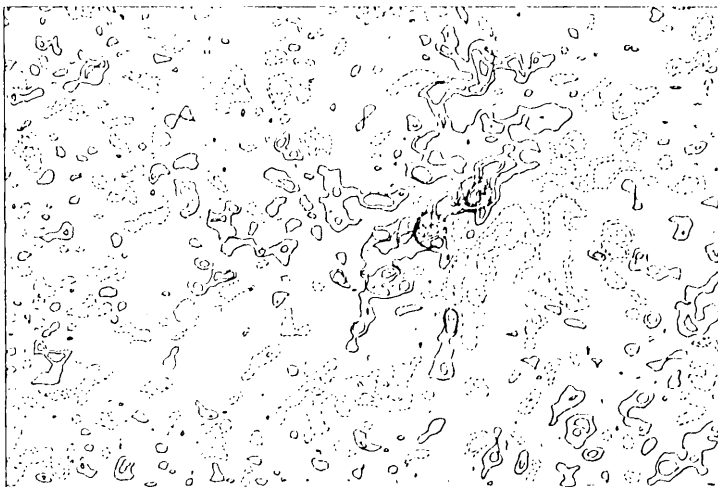


Fig.4. The position of flares are traced by the circle.

The flow have different direction where flares occurred.

Levels: 400,800,1600,2400,3200,4600,6000...M/Sec.

Above characters show that the energy of the small flares come from excessive magnetic energy of force-free magnetic field which are produced by the compression and osmotic motion of oppsity poles. There effects adjust potential analyses support the force-free field. These observations and analyses support the mode of flare by the compresive force-free magnetic fields [2].

The constructions of magnetic and velocity fields of the small flares are consisted with that of the large flares, that may be inspiration to stellar flares with larger size and energy.

References

- [1]. Ai Guoxiang and Hu Yuefeng, *Acta Astronomica Sinica.*, Vol.27, No.2, (1986), 173.
- [2]. Ai Guoxiang and Kong Fanxi, *Acta Astronomica Sinica.*, Vol.23, No.3, (1982), 211.